



Research and Sponsored Programs Office (RSPO)

Research Naval Postgraduate School (NPS Research Newsletter)

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v. 2, no. 7, April 2010

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VOLUME 2, NO. 7

RESEARCH AT NPS

APRIL 2010

Last month, we announced the renaming of the Director of the Research and Sponsored Programs Office (RSPO) as the Assistant Vice President (AVP) for Research Administration. We are moving ahead with this recruitment. We will also be searching for a Deputy AVP. It is important to understand that these are not new billets; they are the renaming of existing billets. The reasons for the transition of "titles" is to align the position with the current administrative structure of NPS, but more importantly, to assure organizational representation for the NPS researcher.

May will mark the end of our Centennial Celebration. NPS has seen much change and growth during its first 100 years. During the last

twenty years our sponsored programs have continuously grown. NPS is now at the point where funding from sponsored activity is double that of the mission budget provided by the Navy to operate NPS. Where this success is a keen indicator of the respect for NPS expertise, it also presents a number of challenges. It is essential that we maintain an infrastructure that will support NPS. This is not only vital to day-to-day operations, but also to the ability to attract new faculty to NPS. The success of NPS rests on the quality of our faculty. So I will end this introduction as I have started so many in stating that it is the mission of the RSPO to support the faculty, and we will continue to keep that mission at the forefront.

BROWN-BAG SEMINAR SERIES

MAE CONFERENCE ROOM
WATKINS HALL, ROOM 302 • 1200-1300

- 11 May, Tuesday, Electronic Proposal Submission (NSF FastLane, Grants.Gov, NSPIRES....)
- 15 June, Tuesday, Contracting for Support Services
- 15 July, Thursday, Research Initiation Program
- 17 August, Wednesday, Working with NGOs

ESTABLISHMENT OF NPS RESEARCH SAFETY OFFICE

The NPS Research Safety Office (RSO) is being established within the Dean of Research organization. The RSO will be responsible for school-wide, research-related safety- and safety-compliance programs for research activities involving the use of radiation-producing equipment, lasers, electromechanical research devices, explosives, and systems involving the use of hazardous chemicals and reagents. The RSO will report to Wayne Bennett, associate dean of research for infrastructure, operations and safety programs.

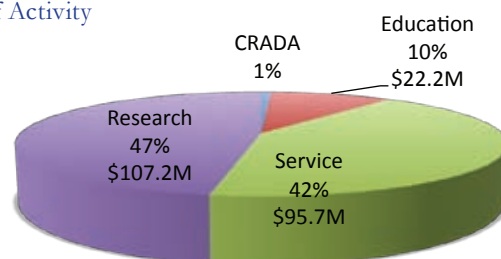
The RSO will support the NPS research community with technical and regulatory compliance expertise, health and safety programs and record-keeping, hazardous and radioactive material and equipment inventory and control services, and safety-related instrumentation inventory and calibration support. It is further expected that the RSO will maintain a robust research safety outreach and education program within NPS and will work with the cognizant deans and institute directors, whose primary roles will be in ensuring the adequate training of personnel involved in their research programs.

The RSO will maintain a collaborative liaison with the NPS Base Safety organization, particularly in regard to occupational safety and health matters.

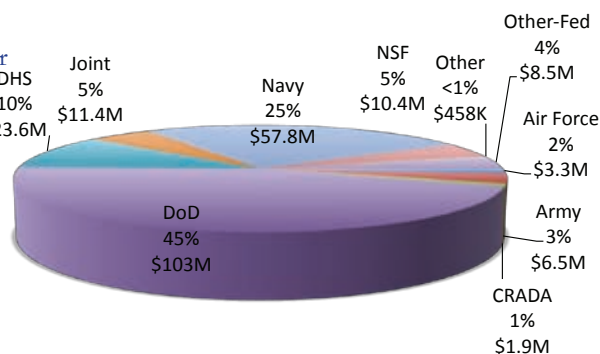
SPONSORED PROGRAMS STATUS, FEBRUARY 2010

FUNDS AVAILABLE: \$226.9M

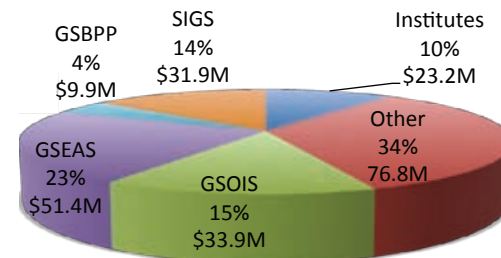
By Type of Activity



By Sponsor



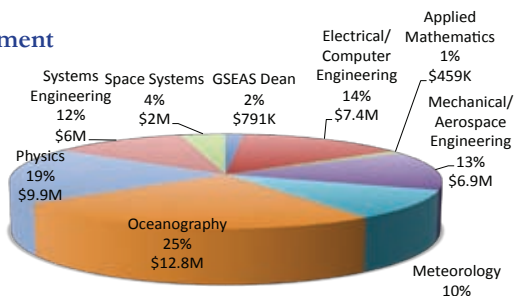
By School



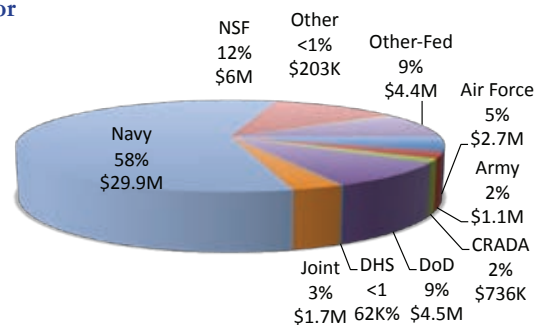
Graduate School of Engineering and Applied Sciences

Funds available to date: \$51.4M

By Department



By Sponsor



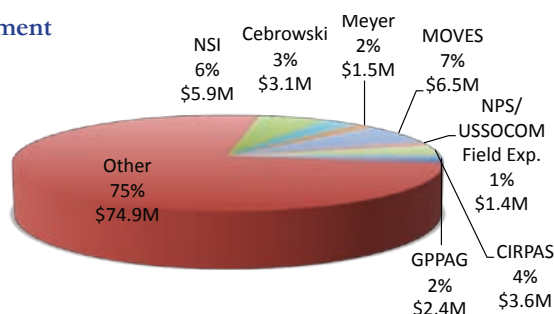
Projects funded in April:

- Advanced Power Systems Models and Design Methods for Electrical Distribution, Robert Ashton, ECE (NSWC-Carderock Division)
- Analysis of Receivers in Systems with Multiple Input–Output, Space–Time Coding, and Orthogonal Frequency, Frank Kragh, ECE (Laboratory for Telecommunications Sciences)
- Classified Advanced Technology Update Short Course (CATU), Herschel Loomis, ECE (Various)
- Joint Threat Warning System (JTWS) FY10 Threat Signals Projection and Research, John McEachen, ECE (USSOCOM)
- PM and Travel Support for Shipboard IW Efforts, Ralph Robertson, ECE (SPAWAR)
- Low-Cost, Portable, Multi-User, Immersive Virtual Environment for Education and Training in Worlds of Unlimited Size, Xiaoping Yun, ECE (NSF)
- Underwater Crack Repairs in High-Strength Structural Steels by Friction Stir Welding, Terry McNeley, MAE (ONR)
- Regional Numerical Weather Prediction Modeling for Aerosol Modeling, Chih-Pei Chang, MR (NRL)
- Satellite Analysis Graduate Studies Support, Philip Durkee, MR (NOAA)
- METOC Metrics Scorecard, Tom Murphree, MR (NRL)
- Portable, High-Efficiency, Wide-Band (500-1,200 Hz) Moored Sound Sources for Shallow-Water Low-Frequency Acoustic Propagation Studies, Ching-Sang Chiu, OC (ONR)
- Role of Pycnocline Turbulent Fluxes in the Evolution of Weddell Sea Water Column Stability, Timothy Stanton, OC (NSF)
- Remotely Triggered Vehicle Mounted IFF (VMIFF): Prototype and Demonstration of Integrated Day-Night (Near IR and MWIR) Device, Nancy Haegel, PH (ONR)
- Measurements and Modeling of the Static and Dynamic Behavior of the Porous Materials of Planetary Sciences, Robert Hixson, PH (NASA)
- Remote Sensing Technology Research (IPA), Richard Olsen, PH (OUSD)
- MASINT Outreach/Liaison Project, Richard Olsen, PH (DIA)
- Formal Methods for Architecture Model Assessment in Systems Engineering, Kristin Giammarco, SE (USACERDEC)
- Space Situational Awareness: CUBESAT Bus, Attitude Control, and Utilization, James Newman, SP (Lawrence Livermore National Laboratory)

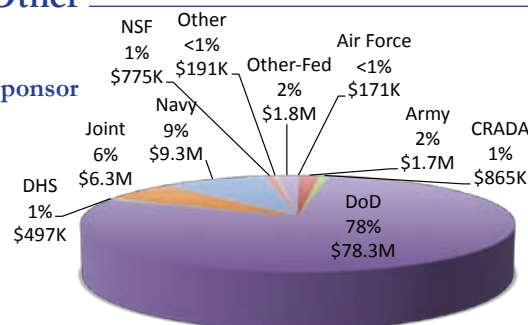
Research and Education Institutes, Centers, and Other

Funds available to date: \$100M

By Department



By Sponsor



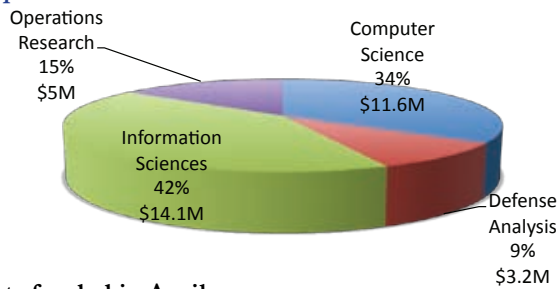
Projects funded in April:

- Research Support to Hybrid Knowledge Management System for Complex Operations, Karen Guttieri, GPPAG (ONR)
- Recognizing Patterns of Anomie that Set the Conditions for Insurgency, Karen Guttieri, GPPAG (ONR)
- J7 Cyber Training, Alan Howard, GPPAG (USJFCOM)
- Singapore Foreign Military Sales Case-Short Course Delivery, Karl van Bibber, VP/Dean of Research (Defense Science & Technology Agency)
- Naval Postgraduate School Support to Joint IED Defeat Test Board (JTB), Edward Lesnowicz, NSI (JIEDDO)
- AECV Puma UAV Operations at Roberts Project, Robert Bluth, CIRPAS (USSOCOM)
- Toyon Unicorn UAV Flight Testing, Robert Bluth, CIRPAS (TOYON Research Corporation)
- SMART Scholarship Support Program, Knox Millsaps, SMART (OSD)

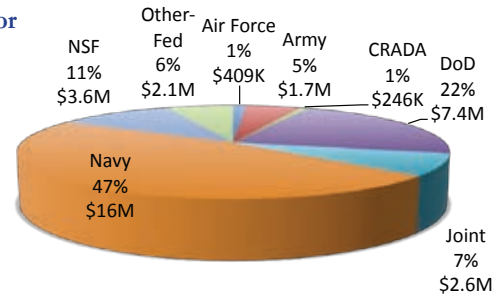
Graduate School of Operational and Information Sciences

Funds available to date: \$33.9M

By Department



By Sponsor



Projects funded in April:

- Analysis of EFV Software Quality and Maintainability, Mikhail Auguston, CS (USMC – MARCORSYSCOM)
- Navy Certifier Program Special Offering, Karen Burke, CS (NAVSUP)
- 2010 Identity Management Certificate Program (DMDC), Cynthia Irvine, CS (DMDC)
- Preliminary Enhancements to Selected Courses for the 2011 SEED Program, Cynthia Irvine, CS (NSA)
- Software Engineering Master's Degree Program, Loren Peitso, CS (Various)
- SKOPE Seminar Support, Nancy Roberts, DA (SAF)
- Winning in Afghanistan: Separating Illusion from Reality FY10, Hy Rothstein, DA (OSD)
- Trident Warrior 10: FORCENET, Shelley Gallup, IS

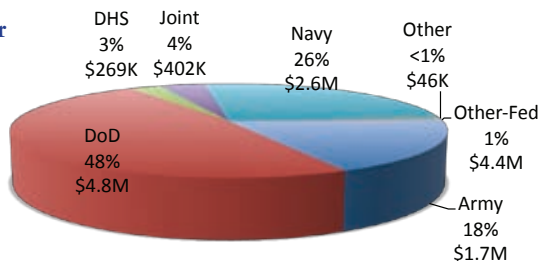
(SPAWAR)

- NPS Support for CY2010-2012 Rapid Pro VIRT (RPV), Frederick Hayes-Roth, IS (USMC – MARCORSYSCOM)
- KVA+RO+SD to Create Flexibility: 3DVIS and Collaborative PLM Tools to Support Shipmain, Thomas Housel, IS (OSD)
- Naval Operations Analysis III, Jeffrey Kline, OR (Northrop Grumman Shipbuilding, Inc.)
- Statistical Support to the Apache Block III Test Program, Robert Koyak, OR (Yuma Proving Ground)
- Principles of Ensemble Modeling and Decision Support, Eva Regnier, OR (CNMOC)
- Quantitative Evaluation of Squad and Team Leader Performance With and Without GSS, Christian Smith, OR (TRAC Monterey)

Graduate School of Business and Public Policy

Funds available to date: \$9.9M

By Sponsor



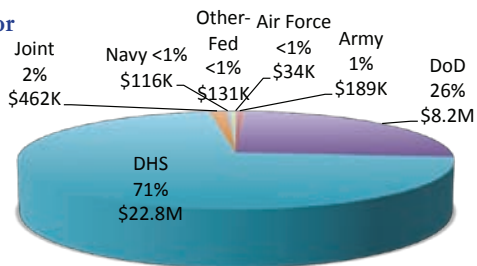
Projects funded in April:

- Support to the Naval Supply Systems Command, Kenneth Euske, GSBPP (NAVSUP)
- PEO IWS 7.0 - Chair of Acquisition and Acquisition Research Program, Keith Snider, GSBPP (PEO IWS)

School of International Graduate Studies

Funds available to date: \$31.9M

By Sponsor



Projects funded in April:

- Towards Effective Emerging Infectious Disease Surveillance II: Swine Flu in Mexico 2009 & USA 1976, Sophal Ear, NSA (DTRA)

- Resource Conflicts: Emerging Struggles over Strategic Commodities in Latin America, Maiah Jaskoski, NSA (DTRA)
- NPS Afghanistan COIN Web Portal, Thomas Johnson, NSA (OSD)
- Near-Term Afghanistan Data Development - Tier 1, Thomas Johnson, NSA (TRAC-Monterey)
- U.S.-Indian Strategic Dialogue V, Samir Kapur, NSA (DTRA)
- U.S.-Pakistani Strategic Dialogue V, Feroz Khan, NSA (DTRA)
- NPS Support for DHS National Fusion Center Capability Curricula Development, Ted Lewis, NSA (DHS)
- Proliferation Dynamics in Southeast Asia: The Implications of Great-Power Rivalry, Michael Malley, NSA (DTRA)
- Allied Security and an Integrated Satellite Network, James Moltz, NSA (DTRA)

NPS-DISE GROUP DEMONSTRATES THE VALUE OF APPLIED RESEARCH THROUGH FIELD EXPERIMENTATION AND ANALYSIS

Research Associate William Roeting, Director, JBAIIC Testing Department of Information Sciences

As an academic and research institution, the Naval Postgraduate School has earned a reputation for excellence among its academic peers as well as within the DoD, the intelligence community (IC), and other government agencies (OGA). Complementing academics and research, there is an equally important area that NPS also excels: applying research through field experimentation and analysis. Field Experimentation and analysis is where research transitions to “relevance.”

With the limited availability of DoD research dollars, research initiatives must have a clear “end game” that demonstrates tangible applicability and value. From a Joint Capabilities and Integration Development System (JCIDS) process perspective, research initiatives must attempt to satisfy a known capability gap and be assessed through rigorous field experimentation and analysis to demonstrate military utility. There are a number of DoD organiza-

rigorous and focused data collection, data reduction, and data analysis that culminates with a final report that addresses the analysis with findings and results.

Three years ago, the DISE Team expanded its field experimentation and analysis capability when it was commissioned by the Commander, US Joint Forces Command (USJFCOM) to establish and manage an ISR integration test bed through a project referred to as the Joint Battlespace Awareness ISR Integration Capability (JBAIIC). Parenthetically, the USJFCOM is responsible for leading the DoD’s Battlespace Awareness–Joint Capability Area (JCA) within the JCIDS Process. To further support battlespace awareness, the Commander, USJFCOM chartered the JBAIIC ISR test bed with establishing ISR data interoperability among disparate air and ground sensors as well as other Intelligence data from other government agencies. The overall objective is to generate and display an “interactive” common intelligence picture / common tactical picture (I-CIP/CTP) that could be used both operationally and tactically. As a natural evolution to the JBAIIC I-CIP/CTP, images and motion video were also integrated into the I-CIP/CTP for operational and tactical edge utilization (Figure 1).

From an infrastructure standpoint, to satisfy the USJFCOM charter, the NPS JBAIIC team configured three trailers and one H2 (Hummer) to support in two equally important capabilities: (1) an ISR integration test bed to support the systems engineering and integration required to establish ISR sensor data interoperability and (2) operational and tactical infrastructure to support remote Field Experimentation and Analysis. For the latter, the three trailers performed as surrogates for a Battalion Tactical Operations Center (BN TOC), a Battalion Network Operations Center (BN NOC), and a maintenance trailer. The H2 performed the role as a Stryker surrogate to support mounted and dismounted operations under the command and control (C2) of the BN TOC. Figure 2 refers. To satisfy classification requirements for various DoD and IC systems, the JBAIIC BN TOC and NOC were designed to support two Secret enclaves as well as multiple unclassified enclaves to include a JBAIIC Virtual Private Network (VPN) with current nodes at the NPS JBAIIC Lab, Camp Roberts, China Lake, the USJFCOM Joint Intelligence Center (JIC), and the Customs and Border Protection (CBP) - Air Marine Operations Center (AMOC) in Riverside, California. The JBAIIC H2 mobile vehicle supports one Secret and multiple unclassified enclaves.



Figure 1. The JBAIIC I-CIP/CTP includes blue/red force tracks (air & ground), Unmanned Aircraft Systems (UAS) tracks, UAS sensor points of interest tracks, images, motion video, SIGINT ellipses, and Unattended Ground Sensor (UGS) tracks. Link 16 tracks were omitted to avoid classification issues.

tions that perform field experimentation and analysis but, few as an “independent” third party like the NPS Distributed Information Systems Experimentation (DISE) Group. With a staff that offers both academic prowess and military expertise, for the last 10 years, the NPS DISE Group has provided field experiment and analysis services in a variety of DoD experimentation venues that include: Fleet Battle Experiments (FBE), Trident Warrior (TW), Empire Challenge (EC), Joint Expeditionary Forces Experiment (JEFX), and Extended Awareness (EA) as well as Joint Capability Technical Demonstrations (JCTD) and smaller, time sensitive, limited objective experiments. Using the power of a time-tested knowledge management system branded as F.I.R.E. (FORCenet Innovative Research Enterprise), the NPS DISE Group designs, develops, and manages the objectives for complex field experiments to support



Figure 2. JBAIIC ISR Test Bed infrastructure. BN TOC, BN NOC, Stryker Surrogate, and maintenance trailer.



Figure 3. Seal Team 8 Combat Evaluation architecture. Reflects only the Brigade TOC and one MAF.

Even though the NPS JBAIIC Team had been successful at integrating disparate air and ground sensors for the generation of the I-CIP/CTP, one major hurdle remained ... providing the I-CIP/CTP to the tactical edge. This would require a man portable, tactical radio with sufficient bandwidth and throughput to support the transport of the I-CIP/CTP data to the tactical edge. In addition, the radio must be IP capable to access data from various DoD/IC network sources, i.e., Link 16, FBCB2, C2PC, UGSs, and UASs as well as other Intelligence Community data sources. Initially, the NPS JBAIIC Team had been using the Harris PRC117'F' radio with modest success. The PRC117'F' had good line of sight (LOS) capability but limited throughput over MILSATCOM systems for beyond line of sight (BLOS) operations. During Empire Challenge 08 and 09, the NPS JBAIIC Team introduced the new Harris PRC117'G' radio which significantly expanded the bandwidth and throughput required to support the generation and display of the I-CIP/CTP to the tactical edge plus it provided a commercial satellite capability over the INMARSAT satellite system for BLOS operations. Parenthetically, the PRC117G radio is now being deployed by SOCOM forces, USMC forces, and USA Forces in both Iraq and Afghanistan largely due to the Field Experimentation and Analysis performed by the NPS JBAIIC Team.

With the communications and network access issues resolved, the NPS JBAIIC team realized that the I-CIP/CTP capability needed to gain broader visibility by demonstrating “tactical relevance.” In other words, what real-time missions would specifically benefit from having the JBAIIC I-CIP/CTP capability AND could be easily incorporated into an existing CONOP and TTP. The first mission evaluated was with a BN TOC and convoy operations during Empire Challenge experimentation. For both users, the I-CIP/CTP provided near real-time updates to the movement of the convoy as well as provisioning for ISR information that provided both the Convoy Commander and BN TOC Commander with situational awareness that included the location of the vehicles in the convoy, the location of fire from remote

propelled grenades (RPG), explosions of Improvised Explosion Devices (IEDs) using acoustic sensors, identifying the location of implanted IEDs using hyper-spectral sensors, and identifying the location (range and bearing) of shots fired in the vicinity of the convoy using acoustic sensors which would trigger a response by the BN TOC CDR to deploy quick response forces (QRF).

The next operational mission that the NPS JBAIIC Team focused on was the Close Air Support (CAS) mission coordinated by the Joint Terminal Attack Controller (JTAC) with strike aircraft. On the battlefield, the JTAC is responsible for the ground coordination of tactical aircraft performing close air strikes for either planned missions or time sensitive missions involving ‘pop up’ targets of opportunity or troops in contact (TIC) missions. In order for the JTAC to have the confidence in executing a strike, by doctrine, he must have a clear view of the battlespace not only to identify potential targets but, to avoid fratricide and mitigate civilian casualties. By providing the JTAC with the JBAIIC I-CIP/CTP display, the JTAC could significantly enhance his situational awareness by having a “distant” visual representation of the location of friendly ground forces to avoid fratricide as well as Link 16 tracks of inbound strike aircraft that would facilitate much earlier coordination with the strike aircraft pilot to begin the pre-strike planning process to optimize strike missions. In addition, the JTAC could also see the location of UAS aircraft that could be directed to surveil a potential target and provide the JTAC with either images and/or motion video of the target to mitigate civilian casualties.

Realizing this potential, the NPS JBAIIC Team worked with the Special Operations Command (SOCOM) and the Mitre Corporation to integrate the JBAIIC I-CIP/CTP into the Battlefield Air Operations Kit (BAO Kit) used by SOCOM JTACs. This capability was successfully tested and demonstrated during Empire Challenge events. Comments from qualified JTACs participating in the event referred to the JBAIIC I-CIP/CTP as a “game changer.” With the “game changing” capability now visible to SOCOM entities, earlier this year, Seal Team 8 (ST8) approached the NPS JBAIIC Team about incorporating the JBAIIC I-CIP/CTP for an in theater Combat Evaluation. The Combat Evaluation architecture, Figure 3, provides the JBAIIC I-CIP/CTP capability for a brigade sized TOC with three disbursed command posts (CP) each with two Mobile Assault Forces (MAFs). The Brigade TOC, CPs, and MAFs would be connected either LOS or BLOS using the PRC117Gs with the INMARSAT Broadband Global Area Network (BGAN) capability as the communications backbone. Each MAF team would have inter-MAF communications and tracking capability along with the

I-CIP/CTP using the Sierra Nevada Corporation (SNC) Tactinet system and devices that are integrated into the PRC117G communications backbone. This architecture is intended to not only provide situational awareness for the MAFs but, enhanced C2 between the BDE TOC, CPs, and the MAFs. In addition to situational awareness tracks, the I-CIP/CTP architecture is designed to provide chat and VoIP capabilities as well as images and motion video from UASs. The in theater Combat Evaluation of the JBAIC I-CIP/CTP is scheduled for late Spring or early Summer 2010.



Figure 4. Principal investigator Bill Roeting at Empire Challenge 2009.

A MOBILE, PHASED-ARRAY DOPPLER RADAR FOR THE STUDY OF SEVERE CONVECTIVE STORMS

Research Associate Robert Bluth of CIRPAS and Professor Jeffrey Knorr of the Department of Electrical and Computer Engineering are research collaborators featured in the May 2010 edition of the *Bulletin of the American Meteorological Society*. Their work addresses the problem that many severe convective storms and tornadoes evolve on time scales shorter than that resolved by most mechanically scanning radar systems. Even when the reflectivity and Doppler wind field in a tornado at low levels is viewed about every 15 seconds, not all the evolution is captured.

The researchers used a phased-array (electronically scanning, “agile-beam”), fixed-site, S-band Doppler radar (the National Weather Radar Testbed Phased-Array Radar (NWRTPAR)) to obtain rapid-scan observations that will offer more complete data.

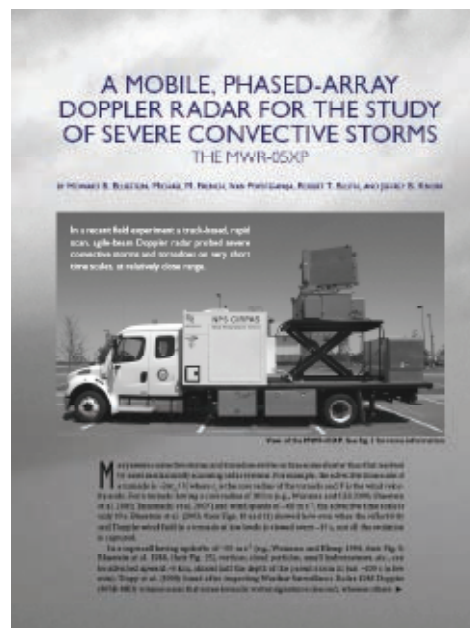
To get near enough to convective storms that satisfactory spatial resolution become possible, radar should be mobile. NPS researchers have developed a mobile X-band radar, based on military phased-array technology, that is well suited for severe-weather research. Mounted on a heavy-duty truck, the MWR-05XP can be deployed in about five minutes. While the antenna is small enough to mount on a truck, it is also large enough to carry a strong signal. Most ground-based mobile radar antennas scan mechanically, with a lengthy volumetric update time of at least 1–2 min. The new system’s radar features a hybrid antenna with pulse-to-pulse

electronic elevation scanning, limited electronic azimuth scanning, and rapid mechanical azimuth scanning, including pulse-to-pulse elevation-plane beam steering for rapid volume imaging and electronic back-scanning in azimuth to avoid beam smearing. The volumetric update time is about ten seconds.

Phased array (MWR-05XP) is an Army tactical radar modified for CIRPAS by ProSensing, Inc., for meteorological and other distributed target applications. Electronic scanning in elevation angle is accomplished by changing the phase delay among the antenna elements using phase shifters; electronic scanning in azimuth (over a limited sector) is achieved by changing the frequency (“frequency hopping”—made possible because the radar has frequency agility) of beams coming out of a slotted waveguide, such that the phases are changed as the frequency is changed.

Field operations using the MWR-05XP have proven successful in collecting “rapid-scan,” storm-scale, Doppler data in severe convective storms, particularly in tornadic supercells when features evolve very quickly as a result of high wind speeds and strong updrafts and downdrafts.

Efforts will be undertaken to determine how useful rapid-scan, storm-scale observations actually are. It has been shown that the reflectivity and Doppler velocity fields in convective storms probed by the MWR-05XP either compare well qualitatively with data collected by other radars or represent idealized phenomena well.



Whether rapid-scan observations can actually improve scientists’ physical understanding or improve numerical forecasts is undemonstrated; further studies are needed. Also recommended are experiments to determine whether assimilating rapid-scan data into a numerical cloud model can improve representation of non-measured variables and short-term forecasts. Hu and Xue (2007) found that a high frequency of assimilating WSR-88D data does not necessarily lead to improvements. This issue needs further exploration with rapid-scan data, especially after the initial forecast period.

PHYSICS PROFESSOR RECEIVES ALLEN S. GRIFFIN AWARD FOR EXCELLENCE IN TEACHING

Distinguished Professor Nancy Haegel was one of twenty-one Monterey Peninsula teachers to receive the 2010 Allen S. Griffin Award for excellence in teaching, positive influence on students and educators, and community service.

The award, created by bequest of the late Col. Allen Griffin, founder and former publisher of *The Herald*, recognizes outstanding teachers at the high-school through post-secondary levels.

Nancy joined the Naval Postgraduate School Department of Physics in 2003, having taught physics at Fairfield University in Connecticut and materials science at UCLA. Her areas of scientific expertise are high-resistivity transport, transport imaging with novel optical techniques, IR detectors, and polymer emitters for military applications.

Among her many honors are a David and Lucile Packard Fellowship in Science and Engineering (1988), a Humboldt Fel-

lowship at the Max Planck Institute for Extraterrestrial Physics (2000), the American Physical Society Prize for Research at an Undergraduate Institution (2004), and the Schiefelin Award for Teaching Excellence at NPS (2008). Professor Haegel is a member of the Board of Trustees of the University of Notre Dame and recently completed a three-year term on the American Physical Society Committee on the Status of Women in Physics.



*Distinguished Professor
Nancy Haegel*

TAMING THE FRONTIER: A MYTH OF IMPOSSIBILITY**Charles C. Readinger—Major, United States Marine Corps****Master of Arts in Security Studies—March 2010****Advisor: Paul Kapur, Department of National Security Affairs****Second Reader: Feroz Khan, Department of National Security Affairs**

Since the establishment of the Durand Line in 1893 as the international border between Afghanistan and British India, the frontier areas on the eastern side of the border have not been integrated into the social fabric or political framework of the government. Conventional wisdom views integrating the tribes of the FATA as extremely difficult, if not impossible. The real reason is that neither the British nor subsequent Pakistani administrations committed the appropriate resources or attention to accomplish the task due to a lack of political will. Geopolitical influences and Islamist militants drove the resistance that deemed the effort to integrate the Federally Administered Tribal Areas, an area void of significant natural resources, not worth the cost. The terrorist organizations that Pakistan supported both covertly and overtly in the frontier areas are now uncontrollable and the very instruments intended to promote the national interests of a nuclear armed yet power deficient state pose an existential threat to the government they were intended to serve. Contemporary rhetoric now supports complete integration of the FATA into the writ of the Pakistani government. The good news for those policy makers who see this as a daunting task is that no government has really tried. *Major Readinger received the Hans Jones Award for Excellence in Thesis Research in Special Operations and Irregular Warfare or Security, Stabilization, Transition, and Reconstruction.*

CONGRESS AND NATIONAL SECURITY: INTEREST, INFLUENCE AND SPEED**Matthew S. Van Hook—Major, United States Air Force****Master of Arts in Security Studies—March 2010****Advisor: Jeffrey Knopf, Department of National Security Affairs****Second Reader: Erik Dahl, Department of National Security Affairs**

Both the President and Congress have Constitutional responsibility for the nation's security. The U.S. Congress, like the President, demonstrates both interest and influence over national security affairs. An effective and often overlooked means of determining this interest and influence is to examine Congress's speed of action and the factors that influence this speed. The following five variables affect Congress's speed and provide a useful method of analysis: constituent concern, interest groups, committees and subcommittees, party leadership and presidential leadership. This thesis examines the impact of these variables in two case studies of security agency organizational reform. The Intelligence Reform and Terrorism Prevention Act of 2004 and the Goldwater-Nichols Department of Defense Reorganization Act of 1986—both represent the fast action of Congress on vital national security problems. Though the effects of particular variables differed in the two cases, this study concludes that Congress does not need a mystical aligning of all the stars in order to move fast on an issue of national security. Instead, the positive impact of one or two variables combined with the neutrality of the others results in a fast speed of action from Congress on national security affairs. *Major Van Hook was awarded the Outstanding United States Air Force Graduate Award in the Department of National Security Affairs.*

AUCTION MECHANISMS FOR ALLOCATING INDIVIDUALIZED, NON-MONETARY RETENTION INCENTIVES IN COMPLEX DECISION ENVIRONMENTS: EVALUATION VIA LABORATORY EXPERIMENTATION**Kyle P. Hahn—Captain, United States Marine Corps****Co-Advisor: William R. Gates, GSBPP****Co-Advisor: Peter J. Coughlan, GSBPP****Second Reader Noah Myung, GSBPP**

Interest in non-monetary incentives (NMIs) as a retention tool in the military services is increasing; however, prior research indicates that providing the same NMIs to all retainees is an expensive and inefficient approach. This research used an experimental methodology to investigate the use of auction mechanisms that create individualized retention bonuses combining both monetary and non-monetary incentives. Specifically, the experiment examined individuals' behavior patterns in using these auction mechanisms while including NMIs with independent and combinatorial qualities (complements and substitutes). Prior research with NMIs has assumed an additive relationship; however, this is often not the case. Hypotheses suggested that experimental subjects would choose NMI combinations that maximize their personal compensation value and then appropriately adjust their bid to the optimal level. The experimental results of the study support the hypotheses. In all auction formats, individuals appropriately selected the optimal NMI combinations 70 percent of the time. Those choices that were considered complex were still chosen correctly 66% of the time, suggesting individuals do behave rationally when dealing with various combinations of NMIs. These results provide support for the practical use of such auction mechanisms for incorporating NMIs in the retention process. *Captain Hahn won the Marine Corps Association Superior Service Award for Outstanding U.S. Marine Student.*

PERSUASION DETECTION IN CONVERSATION**Henry T. Gilbert IV—Lieutenant, United States Navy****Master of Science in Computer Science—March 2010****Advisor: Craig Martell, Department of Computer Science****Second Reader: Pranav Anand, Department of Computer Science**

We present a system for annotating persuasion in conversation based on a social-psychological model. We augmented the social model developed by James Cialdini with some of our own categories for annotators to label. The conversations consisted of 37 hostage negotiation transcripts from private and public sources, with all personal information removed from the private source transcripts. We evaluated the level of agreement between annotators using Cohen's Kappa measurement. Initial results showed only fair to moderate agreement, with an average kappa score around 0.41 for transcripts of significant length (over 200 utterances). Based on these results, annotators revised the annotation model and eliminated some categories of persuasion while adding "other" as a catchall for any persuasive utterance not covered by Cialdini. The revised model showed a significant increase in agreement with an average kappa score of 0.78 for transcripts of significant length (over 200 utterances). Based on this revised model, annotators adjudicated a final persuasion corpus for the 37 transcripts that will be used in future works on persuasion detection. *Lieutenant Gilbert received the Rear Admiral Grace Murray Hopper Computer Science Award.*

MEMORANDA OF UNDERSTANDING/ AGREEMENT (MOUS/MOAS)

Collaborative Research Between NPS and Commander, U.S. Pacific Fleet

The Naval Postgraduate School recently entered into a memorandum of understanding with the COMPACFLT to provide a framework for collaborative research projects intended to benefit both commands.

Under the collaborative relationship, COMPACFLT receives access to NPS student and faculty researchers that may help address theater operational challenges. In return, NPS students and faculty obtain an enhanced understanding of the unique missions and requirements of a major naval combatant command to provide context for their research. NPS faculty and students may also gain access to CPF operational data, staff expertise and subordinate commands to facilitate their efforts. COMPACFLT and NPS will each appoint a collaborative research coordinator to act as their central point of contact to manage, maintain and promote the projects.

Associate Dean of Research Douglas Fonts is the NPS Coordinator for this initiative.

Partner: Department of State

PI: Scott Jasper, Center for Civil–Military Relations

Summary: The agreement allows funds to be transferred to NPS/CCMR for the activities set out as a part of the Global Peace Operations Initiatives (GPOI) and such other related purposes as directed by the Department of State.

Partner: Intelligence Systems Support Office (ISSO)

PI: R. C. Olsen, Physics

Summary: The scope of this MOU encompasses the responsibilities of the parties with respect to cooperative research and development activities in the field of advanced communities, information technology, surveillance, and reconnaissance.

PATENT APPLICATIONS AND AWARDS

Miniature Micro-Electromechanical System (MEMS) Directional Sound Sensor, Navy Case No. 20090002.

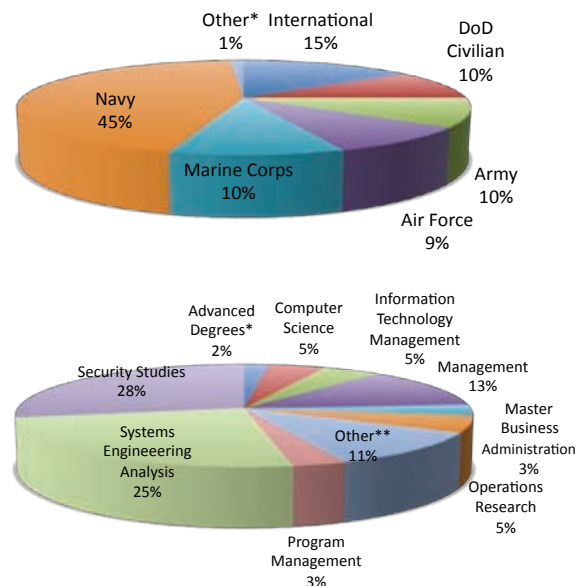
Inventors: Gamani Karunasiri and Jose Sinibaldi (Physics)

Method for Identifying and Blocking Embedded Communications, Navy Case No. 8389D1.

Inventors: John McEachen and Maj. William Geissler, USAF (Electrical and Computer Engineering)

DEGREE STATISTICS FOR MARCH 2010 GRADUATION

(Graduate demographics and degrees awarded)



*Advanced Degrees: Astronautical Engineering (1), Security Studies (1), Electrical Engineer (1).

**Other: Applied Physics (1), Defense Analysis (1), Electrical Engineering (3), Engineering Acoustics (1), Information Systems and Operations (4), Information Warfare Systems Engineering (1), Human Systems Integration (1), Manpower Systems Analysis (3), Mechanical Engineering (2), MOVES (3), Physical Oceanography (1), Physics (1), Software Engineering (1), Space Systems Operations (1), Systems Engineering (2)

TECHNICAL REPORTS PUBLISHED

NPS- GSBPP-10-001	A Primer on Applying Monte Carlo Simulation, Real Options Analysis, Knowledge Value Added, Forecasting, and Portfolio Optimization	J. Mun and T. Housel
NPS-GSBPP-10-002	The Economic Evaluation of Alternatives	F. Melese
NPS-GSBPP-10-003	Requirements Framework for the Software Systems Safety Review Panel (SSSTRP)	Luqi, V. Berzins, J. Rivera
NPS-GSBPP-10-004	P-8A Poseidon Multi-mission Maritime Aircraft (MMA) Software Maintenance Organization Concept Analysis	B. Naegel, D. Petross
NPS-GSBPP-10-005	Performance, Award Free and Cost Incentives during System Design and Development	G. Hildebrandt
NPS-GSBPP-10-006	The Role of Trans-Atlantic Defense Alliances in a Globalizing World	N. Hansel
NPS-GSBPP-10-007	Process Evaluation of SWOS Division Officer Training	A. Crawford and C. Stoker
NPS-IS-10-001	PACOM JIOC – Business Process Model	G. Schacher, R. Kimmel, D. MacKinnon

Technical reports may be obtained at <http://www.nps.edu/Research/TechReports.html>